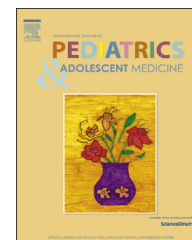


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ORIGINAL ARTICLE

Do parents in Saudi Arabia store medications safely?



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Abstract *Background and objectives:* Safe storage of medications can prevent the accidental poisoning of children. How medications are stored in homes in the Saudi community is not known. The objective of this study was to assess the safety measures for drug storage that are employed by parents to avoid unintentional drug poisoning of children below the age of 6 years.

Materials and methods: This was a cross-sectional survey study based on a validated questionnaire created using the Survey Monkey online tool.

Results: Ninety-three percent of the respondents did not store medications in secure and safe places such as locked boxes or locked drawers; however, more than half of the respondents (54.3%) stored medications at a level that was above the eye level of an adult. The majority of drugs (60.2%) were kept in the fridge; 45.9% were kept in kitchens, 45.1% in bedrooms, 8% in living rooms and 2% in bathrooms. Thirty percent of the respondents stored medications in two places, and 10% stored medication in three or more places. Eighty-nine percent disposed of unwanted medicines by throwing them in the trash, only 11% returned them to the pharmacy, and 11% flush them down the toilet.

Conclusions: These results raise concerns about how drugs are stored and disposed of in the community. Additional community education and awareness programs regarding the safe storage of drugs in the home and the identification of useful and accessible methods of drug disposal are needed.

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1. Introduction

Unintentional poisonings are a major cause of nonfatal injuries in children, especially those less than two years old [1]. In 2010, the American Association of Poison Control Centers (AAPCC) reported that among the over 1.5 million pediatric poison exposures (63% of all human exposures), children younger than 3 years of age were involved in 37.7% of exposures, and children younger than 6 years accounted for approximately half of all human exposures (50.5%); furthermore, most of these exposures (93%) occurred at home [2].

It has been noted by many researchers from various countries that significant toxic exposure-related problems are unique to their socio-economic and cultural environments [3–10]. A study from Saudi Arabia revealed that childhood poisonings accounted for 88% of the poisoning cases reported to one poison control service in Riyadh City [11]. This study also showed that more than 90% of these cases involved children below the age of 5 years, and 2.3% and 5.7% of the cases occurred in children between 5 and 8 years and between 9 and 12 years, respectively [11].

Toxicology-related visits to Emergency Department (ED) among children less than five years old are increasing and have led to the conclusion that the current poisoning prevention efforts are inadequate [12].

Inappropriate medication storage is a worldwide problem. A study conducted in Saudi Arabia reported that the mean number of drugs stored in each household is 8 and that up to 30% of households have at least 10 medications [13]. Similar findings have been reported in other studies from different countries, and these studies have also found that elderly patients tend to have more medications in their homes and that larger households are also predictive of the storage of more medications [14,15]. Previous studies have found significant variations in between the characteristics of parents who do and do not safely store medications or cleaning products [16–18].

Unintentional poisonings in toddlers can be largely prevented by preventive actions, although poisonings can still occur despite such efforts [19–24].

There is a paucity of research regarding the effectiveness of community-based childhood poisoning prevention programs. Therefore, there is a clear need to increase efforts to examine the efficiency of the currently implemented measures for the prevention of unintentional poisoning in children [1,9,23–28]. No study has yet examined how medications are stored in Saudi homes.

The primary objective of this study was to assess the current safety level of drug storage utilized by parents to avoid unintentional drug poisonings among children less than 6 years of age. The secondary goal of the study was to alert people about the improper storage of medications at home and to warn them about the potential for toxicity among children that is secondary to unsafe storage conditions.

2. Materials and methods

This was a cross-sectional survey study based on a validated questionnaire that was created using the Survey Monkey tool.

The questionnaire was written in both English and Arabic languages and was distributed using social media websites (primarily Twitter and Facebook). The survey examined the following information: the presence of medications at home, the safety level of medication storage, medication disposal, and factors that might contribute to improper storage of medications at home, including the numbers in the households, the level of education and the presence of patients with chronic diseases in the households.

We defined safe drug storage as drug storage that occurred in locked places, such as cupboard, drawers or special boxes.

The participants were assured about the confidentiality of their responses, and they were informed that the study was about home safety issues with the goal of improving the storage of drugs at home to decrease pediatric poisoning. Participants without at least one child below the age of 6 years and non-Saudi residents were excluded from the study.

The study was approved by the Research Ethics Committee at King Faisal Specialist Hospital & Research Centre (KFSH&RC), and participant confidentiality was maintained throughout the study by giving each participant a unique identity number on the data collection sheet that was secured with a password. An informed consent statement was signed at the beginning of the survey. The questionnaire was pre-tested by sending it via email to the staff of the Emergency Department (ED) prior to publishing it on the social media websites.

3. Statistical analyses

The descriptive data were assessed with the software package SAS version 9.3 (Statistical Analysis System, SAS Institute Inc., Cary, NC, USA). Categorical variables were summarized as frequencies and percentages and were compared using the chi-square test. The 0.05 level of significance was used for all data analyses.

4. Results

Data were collected from a total of 1023 respondents; of these respondents, 505 participants met the inclusion

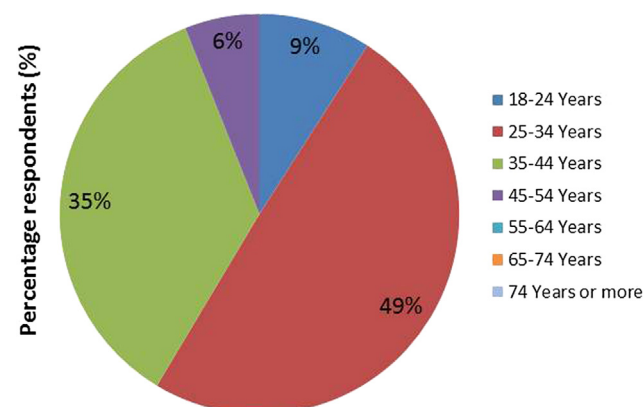


Figure 1 Age distribution of participants.

Table 1 Storage pattern of medications.

Storage way	Responses count (%)
Box or bag or drawer locked with key or number	33 (6.5%)
Box or bag or drawer not locked with key or number	378 (74.9%)
At the level of the adult's eyes	274 (54.3%)
Below the level of the adult's eyes	212 (42.0%)
Other	108 (21.4%)

criteria of the study and were eligible. Approximately 455 (90%) were Saudis. The results revealed that approximately half of the participants (250 or 49%) were in the age range of 25–34 years (Fig. 1).

We found that 93% of the children less than 6 years of age were at risk of accidental poisoning by medications. Most of the eligible respondents did not store medications in secure places such as locked boxes or drawers; however, more than half of the respondents (274, 54.3%) stored medications at or above an adult eye level (Table 1).

Most of the respondents (299, 59%) lived in household of 4–8, 167 (33%) had fewer than 4 in their household and 39 (8%) had more than eight persons living in the same house (Table 4). Most of the participants (96%) had at least completed secondary education, 54% of the participants had bachelor's degrees and (21%) had higher degrees. The rate of the storage of medications in the household was high (99%).

The most often stored classes of medicines were fever and pain medications (95%) followed by cough and decongestant medications (68%) and vitamins and iron (56%) (Fig. 2). The participants with university or higher education levels did not store medication at home any differently than did the participants with lower levels of education. Among the latter group, 93.9% did not store medications in a locked box or drawer, and this percentage was not different from that of the higher education group (P value > 0.05). Half of the participants (50%) had more than five medications in their homes, and 145 (28.71%) had more than ten medications (Table 2). The families with more than eight members were more likely to have more than 10 medications (36%, although this difference was not statistically significant). Moreover, we found that the participants living in household with people with chronic diseases (36%) stored larger numbers of medications; 36.3% of them stored more than 10 medications (P value < 0.05). The majority of the participants (304, 60.2%) stored drugs in the

Table 2 Number of medications kept home.

Number of medication per house	Frequency (%)
1–5	210 (41.58)
6–10	109 (21.58)
More than 10	145 (28.71)
Not sure	41 (8.12)
Total	505 (100)

Table 3 Drug storage sites in the home (Based on 505 respondents).

Place of storage	Frequency (%)
Fridge	304 (60.2)
Kitchen	232 (45.9)
Bedroom	228 (45.1)
Living room	41 (8.1)
Bathroom	10 (1.98)
Other places	36 (7.1)
Two places	151 (29.9)
Three places or more	53 (10.4)

fridge, and others stored them in the kitchen (232, 45.9%), bedroom (228, 45.1%), living room (41, 8.1%) and bathroom (10, 1.98%). Medications were stored in two places by 151 (29.9%) of the respondents and in three or more places by 53 (10.4%) of the respondents (Table 3). Most of the participants kept medications at home for the purpose of future use (78%), because they were used on daily basis (35%) or because they might be useful for another family member if needed (34%). Most of the respondents disposed of unwanted medicines by throwing them in the trash (89%), while others returned to them to the pharmacy (11%) or flushed them down the toilet (11%).

5. Discussion

Unprotected drug storage at home is a major concern in our community. Despite the internationally echoed statement that drugs should be kept out of the reach of children, medications are easy for children to access. There is no law in Saudi Arabia that enforces the use of child-resistant packaging on medications that can cause significant pediatric toxicity [29].

For the first time, the current study presents the level of the safe storage of medications in the Saudi Arabian community in families with at least one child below the age of six years for which the risk of accidental poisoning is high. One study in Saudi Arabia evaluated the extents of medication use and wastage in Saudi Arabia [13]; however, our study is the first to focus on the levels of safety of home medication storage in the Saudi Arabian community and include only families.

We adopted an electronic survey that was designed using Survey Monkey®. This survey was distributed and completed through social media to reach different regions and social classes of the Saudi community.

Table 4 Number of family members per household.

Number of family members per household	Number of participants (%)
Less than 4	167 (33)
4–8	299 (59)
More than 8	39 (8)

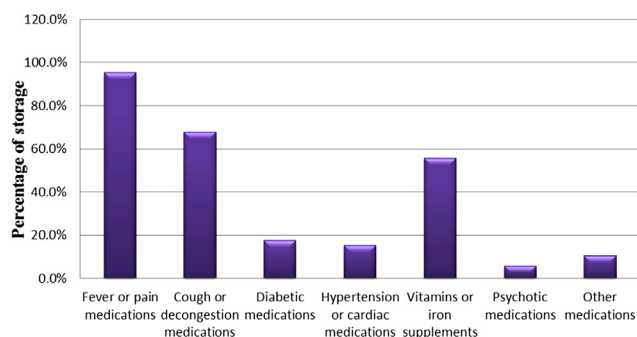


Figure 2 Categories of medications stored.

The gender distribution of participants was even with 51% males and 48% females. Most of the respondents 299 (59%) lived in houses with 4–8 other members (Table 4). Most of the respondents (56%) were from the central region of the country likely because of the size of this region's population, which exceeds six million according to the latest data (2010) from the Saudi Central Department of Statistics & Information.

Only 11% of the participants disposed of unwanted medications by returning them to pharmacies. This low percentage was expected because we have not established medication disposal or recycling systems in Saudi Arabia, and some pharmacies might not accept such medications. Kheir N. et al. (2011) presented similar findings in which a limited number of subjects returned their medications to pharmacies for recycling in Qatar, a neighboring country with citizens that share most habits and public features with the Saudi people [18].

In this study, we found that most of the participants (67%) lived with more than four family members in the same house and that such living situations might increase the likelihood of storing large numbers of medications in our country.

In the current study, we found a high rate of household medication storage (99%) that is similar to the findings reported in a local study [13]. Additionally, the percentage of people storing more than 10 medications was 28%, which is also similar to the findings reported by Abou-Auda (2003) [13]. This observation reflects the high rate of medication storage and high numbers of medications that are stored in our community, and these factors put toddlers at a high risk of accidental poisoning.

Although nearly half of the participants were young (within the ages of 25–34 years), and most of the participants were educated, neither age nor level of education significantly influenced the results (P value > 0.05).

The presence of chronic diseases in any family member was the factor most strongly correlated with the number of medications in the house (P value < 0.05). This observation is unsurprising because polypharmacy is common in patients with lifelong diseases.

Based on our sample population, the medications that are most commonly stored at home in Saudi Arabia were fever and pain medications (95% of participants) followed by cough and decongestant medications (68% of participants), and vitamins and iron (56% of participants) (Fig. 2). These results are inconsistent with the results of some

previous studies that were conducted in other countries. For example, Kheir N. et al. [18] analyzed drug storage data from 49 homes and found that the most commonly stored medications are analgesics (37%) followed by allergy, cough and cold medications (14%) [18].

Some other studies have produced findings similar to our observations. For example, Abou-Auda [13] (2003) found that respiratory medications (16.8%) followed by central nervous system medications (16.4%) and antibiotics (14.3%) were the medicines most commonly stored in Saudi Arabian houses. Zullo A. et al. [30] (2007) found that central nervous medications were the most commonly stored medications in Iran.

In our study, we expected to find that fever and pain medications were the medicines most commonly stored in homes in our community because of the prevalence of chronic pain diseases [31,32]. The inappropriate use of pain killers, such as paracetamol, might be associated with serious toxicity particularly in children for whom the risk of accidental ingestion is high [33]. Therefore, it is important to give special attention to this issue and to implement special strategies to minimize this risk.

We found that cough medications and decongestants where the medications that were the second most frequently stored in Saudi households (68%). This finding might reflect how commonly such medicines are prescribed in Saudi Arabia, although there is no sufficient evidence to support the benefit of these medications, and they are not recommended for use in children under 6 years of age [34].

The majority of the respondents (93%) did not store their medications in secure and safe places such as locked boxes or locked drawers, although more than half (54.3%) stored their medications at levels at or above adult eye level. Furthermore, more than 40% of the participants stored their medications in 2 or more places in their homes, which increases the accessibility of these medications by children and thus increases the risk of accidental poisoning.

Beirens et al. [16] found that 50% of parents in the Netherlands safely store medicines in the home; however, in this study the investigators considered the storage of medications at or above adult eye level as safe. In this study, the investigators reported that, even those with low levels of education, tended to store medications in safe places, and this finding contrast our findings.

Our results revealed that approximately half of the participants kept medications in inappropriate places in which the humidity and temperature are high (46% in kitchens and 2% in bathrooms). Such behavior might affect the stability of the medications because Saudi Arabia is a desert country with high temperatures during the summer.

One of the goals of this survey was to increase the awareness of the importance of the safe storage of medications among families to minimize pediatric accidental poisoning. This goal was achieved by responding to our survey; approximately 58% of the parents believed that this survey increased their awareness of this issue.

6. Limitations

Our study was limited by the relatively small sample size. However, the present analyses could provide general ideas of the safety levels of medication storage and disposal and

might lead to further well-designed and larger studies of this issue.

The use of social media to collect the data for this study might have biased our results because this collection method might have been affected by the ages and levels of education of participants because we found that most of the participants were middle aged and well-educated; thus, we do not know the attitudes of those who did not participate in our survey.

7. Conclusion

We found that the majority of children (93%) in our community are exposed to the risk of accidental poisoning. Our results raise concerns about how drugs are stored and disposed of in the community. More community education and awareness programs regarding the safe storage of drugs in the home and how to find useful and accessible methods of medication disposal are needed.

Conflicts of interest

None.

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